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09/942,835	08/30/2001	John Robertson Tower	SAR 14108	9999

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EXAMINER

GEBREMARIAM, SAMUEL A

ART UNIT PAPER NUMBER

2811

DATE MAILED: 06/20/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/942,835

Applicant(s)

TOWER ET AL.

Examiner

Samuel A Gebremariam

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 April 2003.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21, 31 and 32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21, 31 and 32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

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DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii US patent No. 4,952,523.

Regarding claim 1, Fujii teaches (figs. 8 and 9) a charge coupled device made on a substrate of a first conductivity type (10), the charge coupled device comprising: a dielectric layer (12) overlaying at least a portion of the substrate, and at least two gate electrodes (42, 44) overlaying the dielectric layer, the at least two gate electrodes defining at least two charge wells (32) and (34, 36), the at least two gate electrodes being separated by an inter-electrode gap (the gap between 42 and 44) and means for stabilizing the inter-electrode gap.

With regard to the limitation that "a charge coupled device made according to a standard CMOS process on a substrate", this is considered a product-by-process claim. "[E]ven though product-by process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re*

Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). Furthermore applicant acknowledges in the specification that the process is well known in the art.

Regarding claim 2, Fujii teaches (figs. 8 and 9) substantially the entire claimed structure of claim 1 above including the at least two charge well areas are formed in a semiconductor material of a first conductivity type (10) and the means for stabilizing the inter-electrode gap includes a semiconductor region of the first conductivity type (34, 36) but having a different dopant concentration than the substrate, in the inter-electrode gap (col. 8, lines 45-62).

Regarding claim 31, Fujii teaches (figs. 8 and 9) substantially the entire claimed structure of claim 1 above including an n-channel region (32). Furthermore the channel region (32) is an n well region.

Regarding claim 32, Fujii teaches (fig. 6) substantially the entire claimed structure of claim 1 above including the at least two gate electrodes include polysilicon gate electrodes (column, 11, lines 10-14).

Claims 3-8, 11-13, 18, 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii in view of Ohsawa et al. US patent No. 5,210,433.

Regarding claim 3, Fujii teaches (figs. 8 and 9) substantially the entire claimed structure of claim 1 above except explicitly stating that a further dielectric layer formed over the at least two gate electrodes; and a further gate electrode formed overlying the further dielectric layer and positioned over the inter-electrode gap.

Ohsawa teaches forming dielectric layer (44) over at least two gate electrodes (80) and forming a further electrode (82a) overlying the further dielectric layer and positioned over the inter-electrode gap (region between electrodes 80).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the further dielectric layer and the further gate electrode taught by Ohsawa in the structure of Fujii in order to control the gap potential.

Regarding claim 4, Fujii teaches substantially the entire claimed structure of claim 1 above including the further dielectric layer is a gate oxide.

Regarding claim 5, Fujii teaches substantially the entire claimed structure of claim 1 above including the further gate electrode is formed of a metal layer (fig. 11, Ohsawa).

Regarding claim 6, Fujii teaches substantially the entire claimed structure of claim 1 above including the at least two charge well areas are formed in a semiconductor material of the first conductivity type (10) and the charge coupled device further includes a semiconductor region of the first conductivity type (34, 36), formed in the semiconductor material beneath the inter-electrode gap, and having a different dopant concentration than the semiconductor material forming the at least two charge well areas (col. 8, lines 45-62, Fujii).

Regarding claim 7, Fujii teaches substantially the entire claimed structure of claim 1 above including the means for stabilizing the inter-electrode gap includes means for applying respective bias potentials to the at least two gate electrodes, the bias

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potentials being sufficient to cause fringing fields from the at least two gate electrodes to extend into the inters electrode gap.

Ohsawa teaches (fig. 11) means for controlling gap potential. Therefore the combined structure of Fujii and Ohsawa inherently cause fringing fields as claimed in the gap region.

Regarding claim 8, Fujii teaches substantially the entire claimed structure of claim 1 above including the charge coupled device further comprises: a well region of a first conductivity type (32), adjacent to the photogate for forming a charge barrier well, the charge barrier well being configured to divert photocarriers into at least the photogate; and a diffusion region of a second conductivity type (12), different from the first conductivity type, the diffusion region being formed inside the charge barrier well and being configured as an anti-blooming drain.

The limitation that the diffusion region being formed inside the charge barrier well and being configured as an anti-blooming drain is not given patentable weight. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

Regarding claim 11, Fujii teaches a charge coupled device (CCD) array, the array being formed of a plurality of pixels, each pixel including, a first dielectric layer (12) overlaying the substrate; at least two gate electrodes (42, 44) overlaying the first dielectric layer and defining at least two charge wells (32) and (34, 36), respectively, wherein adjacent ones of the at least two gate electrodes are separated by an inter-electrode gap, a combination of one of the at least two charge wells and its respective overlaying gate electrode forming a photogate optical sensor and a combination of another one of the at least two charge wells and its respective overlaying gate electrode forming a transfer gate; and means for stabilizing the inter-electrode gap.

The recitation "an optical sensor circuit for receiving photocarriers from a source" has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

With regard to the limitation that "a charge coupled device made according to a standard CMOS process on a substrate", this is considered a product-by-process claim. "[E]ven though product-by process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-

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process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). Furthermore applicant acknowledges in the specification that the process is well known in the art.

Regarding claims 12 and 13, Fujii teaches substantially the entire claimed structure of claims 1, 2, 8 and 11 above including a diffusion region of a second conductivity type (12), different from the first conductivity type, the diffusion region being formed inside the charge barrier well and being configured as an anti-blooming drain.

Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii in view of Marsh et al. US patent No. 6,196,932.

Regarding claims 18, 20 and 21, Fujii teaches substantially the entire claimed structure of claims 1, 2, 8 and 11 including that the first and second electrodes are formed of polysilicon (col. 7, lines 54-70).

Fujii does not teach back illuminated imager is shielded from photocarriers generated in response to photons received at the backside of the substrate by the semiconductor junction.

Back illuminated imager is conventional structure that is well known in the art. Furthermore providing shielding structure is also known in the art

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate back illuminated as claimed since backside illuminated image provides a smooth unobstructed entry surface over the entire span of the imaging pixel.

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Regarding claims 16 and 17, Fujii teaches a CCD imager array (fig. 8) and optical integration section (fig. 7).

Fujii does ^{not} teach a CMOS analog to digital converter coupled to receive image signals from the CCD imager array.

CMOS analog to digital converter are conventional and also taught by Marsh (col. 8, lines 55-65).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the conventional CMOS ADC structure taught by Marsh in the structure of Fujii.

Allowable Subject Matter

2. Claims 9, 10, 14 and 15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Reason for allowance

3. The following is a statement of reasons for the indication of allowable subject matter: prior art of record does not anticipate or render obvious the limitation of "a further well region of the first conductivity type, the further well region forming a further charge barrier well; and a plurality of further diffusion regions of second conductivity type in the further charge barrier well, the plurality of further diffusion regions forming a charge sink and a plurality of transistors, wherein one of the at least two gate electrodes that is not a photogate overlies a portion of the further charge barrier well adjacent to the charge sink" for a charge coupled device.

Response to Arguments

4. Applicant's arguments filed 4/3/03 have been fully considered but they are not persuasive. Applicant argues that the dielectric layer of Fujii's structure is not formed according to a standard CMOS process. As discussed above the limitation of forming the dielectric layer according to standard CMOS process is considered as a product by process claim. Since applicant's dielectric layer is not distinctly different from the dielectric layer of Fujii the argument is deemed not persuasive. Further applicant argues that Fujii does not disclose the limitation that the inter-electrode gap has a stabilizing function. In response to applicant's argument that Fujii does not disclose that the inter-electrode gap does not have a stabilizing function, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). Furthermore since Fujii's structure is substantially identical to the claimed structure, it inherently has the stabilizing function.

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Reference A is cited as being related to CCD.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Samuel Admassu Gebremariam whose telephone number is 703 305 1913. The examiner can normally be reached on 8:00am-4: 30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 305-7646. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

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Samuel Admassu Gebremariam

June 15, 2003

Steven Lohr